DOCUMENT RESUME

ED 420 301 IR 018 922

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TITLE The WESTNET Program--SUNY Brockport and the SUNY Campuses in Western New York State: A Case Study in the Benefits and Costs of an Interactive Television Network.

INSTITUTION State Higher Education Executive Officers Association.; California State Univ., Seal Beach. Office of the Chancellor.; Interuniversity Communications Council (EDUCOM), Washington, DC.; State Higher Education Executive Officers Association.

SPONS AGENCY National Inst. on Postsecondary Education, Libraries, and Lifelong Learning (ED/OERI), Washington, DC.

PUB DATE 1998-00-00

NOTE 25p.

CONTRACT R309f60088

PUB TYPE Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.

DESCRIPTORS Case Studies; Computer Assisted Instruction; *Computer Networks; *Cooperative Programs; Cost Effectiveness; *Distance Education; Higher Education; *Partnerships in Education; Program Implementation; Student Reaction

IDENTIFIERS *State University of New York

ABSTRACT

This case study describes a collaborative effort among 10 campuses of the State University of New York (SUNY) to establish a shared distance learning network in western New York state. Participating campuses, led by SUNY Brockport, made a proposal to the SUNY system Office of Educational Technology to form WESTNET, a distance learning network that would provide two-way compressed video connections and related classroom equipment at each of the member institutions. The proposal was funded, the network established, and courses were first offered in the spring 1997 term. This study discusses the background and context of WESTNET implementation; WESTNET cost estimates, including comparisons to a traditional lecture-based course; and benefits of WESTNET in terms of student learning outcomes (in grades and attitudes), institutional renewal and growth, course sharing, and faculty development opportunities. An appendix includes a table showing mean responses of the student attitude survey. (AEF)

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ED 420 301

The WESTNET Program—SUNY Brockport and the SUNY Campuses in Western New York State:

A Case Study in the Benefits and Costs of an Interactive Television Network

The WESTNET Program

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This report is one of a series from a project entitled Case Studies in Evaluating the Benefits and Costs of Mediated Instruction and Distributed Learning. The project is funded through a Field-Initiated Studies Educational Research Grant by the National Institute on Postsecondary Education, Libraries and Lifelong Learning, Office of Educational Research and Improvement, U.S. Department of Education with additional funding provided by Information Resources and Technology in the Chancellor's Office of the California State University. The project is jointly sponsored by the California State University, the National Learning Infrastructure Initiative of EDUCOM, and the State Higher Education Executive Officers. Grant Award No. R309f60088.

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IR018932

Acknowledgments

This report is one of a series from a project entitled *Case Studies in Evaluating the Benefits and Costs of Mediated Instruction and Distributed Learning*. The project is funded through a Field-Initiated Studies Educational Research Grant by the National Institute on Postsecondary Education, Libraries, and Lifelong Learning, Office of Educational Research and Improvement, U.S. Department of Education with additional funding provided by Information Resources and Technology in the Chancellor's Office of the California State University. The project is jointly sponsored by the California State University, the National Learning Infrastructure Initiative of EDUCOM, and the State Higher Education Executive Officers.

The project director gratefully acknowledges the assistance of Christine Haile, SUNY Associate Vice Chancellor for Technology Services for initially identifying this case study; Barbara Sirvis, (former) Vice President for Academic Affairs at Brockport, for her support and assistance on the project; and Bernard Petit, Director of Interactive Telecommunications at Brockport and the case study coordinator, who drafted the learning outcomes component of the study. Susan Bray, President, New Vistas (providing consulting support for distance learning) drafted the Background and Context section of the study.

Support, assistance, and advice were also provided by members of the project's Steering, Review, and Oversight Committee: Tony Bates, Director of Distance Education and Technology, University of British Columbia, Dennis Jones, President of NCHEMS, Jim Mingle, Executive Director of SHEEO, and Tom West, Assistant Vice Chancellor for Information Resources and Technology, CSU Chancellor's Office.

WESTNET—A Case Study in the Benefits and Costs of an Interactive Television Network

Summary, Findings, and Conclusions

1. This case describes a collaborative effort among ten campuses of the State University of New York (SUNY) to establish a shared distance learning network in western New York state. The participating campuses, led by SUNY Brockport, made a proposal to the SUNY system Office of Educational Technology to form WESTNET—a distance learning network that would provide two-way compressed video connections and related classroom equipment at each of the member institutions. The proposal was funded, the network was established, and courses were first offered in spring term 1997.

2. Given the fiscal constraints under which SUNY is operating, it is apparent the campuses cannot afford to individually offer the kind of specialized and diversified courses as they have in past years. A premise of WESTNET is that by providing a telecommunication infrastructure campuses will be able to maintain the diversity of course offerings through their group efforts in sharing courses.

   This consideration was particularly important in the development of a Philosophy Consortium by faculty from several of the campuses. That consortium has provided a model for faculty collaboration that could be expanded to other disciplines as the network expands.

3. The WESTNET campuses plan to create a model for a distance learning network that addresses the interinstitutional issues related to course sharing, administrative support, and technical infrastructure that must be solved in order to make WESTNET a success.

Benefits

Learning Outcomes

4. The evaluation of learning outcomes was based upon data from five courses delivered via WESTNET in spring 1997—one course in Education, one in Nursing, and three in Philosophy. An analysis of the grade data shows that the proportion of students earning grades of "A" or "B" at the sending and receive sites was not statistically significant at the 5 percent level. The proportion of "A" grades earned by sending site students, however, is significantly greater (at the 5 percent level) than the proportion earned by receiving site students.

   The lower proportion of "A"s at the receive sites could be due to the lower overall ability of these students as evidenced by their lower GPAs and as further evidenced by their lower grade expectations. Alternatively, the lower grades may be in some way related to the start-up nature of the network. Additional study of this phenomena is clearly warranted.

5. A student attitude survey was administered to students at both sending and receiving sites. For the specific survey items where there were no significant differences among the send and receive site students, there were no indications unfavorable toward WESTNET. For the specific survey items where receive site responses were statistically different than send site responses, the send site responses were uniformly neutral and the receive site responses were uniformly supportive of WESTNET.

6. Concerns indicated by individual responses to the open-ended questions suggests some logistic problems that are likely to be remedied by more experience with the network. Another concern, that the technology will be used as a reason to downsize academic departments, suggests a misunderstanding that the technology is the source of the fiscal problem facing the system rather than a possible solution to the problem. Finally, both receive and send sites students understand the benefits of the technology as a means of improving access.

Student Access to Courses

7. The SUNY campuses in western New York state provide an important source of access to higher education for residents of the region. One of the WESTNET objectives is to maintain and expand that access. Given the financial constraints the SUNY campuses are operating under, some downsizing of academic departments is occurring. This threatens the viability of degree programs on campuses with relatively small departments and numbers of majors. Course sharing among campuses is one way to maintain degree programs and provide adequate course offerings even where campus departments are relatively small.

   The creators of the Philosophy Consortium at Brockport, Fredonia, and Cortland, for example, have shown that an important traditional discipline can thrive in hard economic times by creatively pooling scarce resources and sharing courses among campuses.

Institutional Renewal

8. The instructors in the five courses evaluated indicated that their involvement with WESTNET offered them new avenues for professional development. These include the possibility of continuing to teach advanced courses, the opportunity to audit

courses of colleagues from other institutions, and the availability of high-tech equipment for classroom use. They felt that their teaching was greatly enhanced by the reorganization of their subject materials to suit the new delivery system. Instructors were pleased with the opportunity to reach new students in their courses, and to offer this clientele a greater variety of courses than had previously been possible.

9. Cooperative arrangements among campuses for course sharing via WESTNET appear to be blossoming. The Philosophy Consortium is expanding and the Nursing Department at Brockport is increasing its course offerings. Other campuses are indicating an interest in participating in WESTNET. Additional departments including Languages - French and Japanese, Political Science, and Recreation and Tourism are either offering or planning to offer courses over WESTNET. Protocols for FTE sharing and assignment of communications line charges are beginning to emerge.

Costs

10. The cost of a WESTNET course was estimated based upon the direct operating and capital costs of a WESTNET studio classroom, transmission costs, and WESTNET administrative overhead. This estimated cost of a WESTNET course is less than that of offering the same course in classroom format with a live instructor at multiple (two or three) locations.

    Cost comparisons such as these are valuable but must be made with a clear understanding of their implications. The comparison of WESTNET costs with the costs of offering the courses separately on each campus should not be interpreted to mean that offering the courses on each campus remains a viable alternative. It is not. Given the fiscal situation, WESTNET provides a less expensive way to deliver these courses that would otherwise be at risk of being eliminated at all sites.

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Background and Context

The State University of New York

This case study describes the beginning of a collaborative effort among ten campuses of the State University of New York (SUNY) to establish a shared distance learning network in western New York state. The participating campuses, led by SUNY Brockport, formed this partnership to address some of the critical fiscal challenges facing SUNY and to take advantage of the new opportunities afforded by emerging distance learning technologies.

Comprised of 64 campuses and enrolling nearly 400,000 students, SUNY is this nation's largest multi-campus public institution of higher education. It includes community colleges, two-year colleges of technology, specialized and statutory colleges, traditional four-year colleges, research universities, and academic health science centers. For almost 50 years, SUNY has been providing quality education at reasonable cost to its students, 95 percent of whom are residents of New York state. SUNY institutions account for nearly 40 percent of all students in higher education in New York. In the western region of the state fully 75 percent of college enrollments are at SUNY campuses.

In 1985 SUNY restated its mission to provide "educational services of the highest quality, with the broadest possible access, fully representative of all segments of the population in a complete range of academic, professional, and vocational post-secondary programs." In general, it seems to be succeeding in this mission. Eight SUNY campuses have been cited by *Money* magazine as among the best college buys in the nation. SUNY has also been successful in reaching a diverse student group. Fifty-six percent of its students are female, 17 percent are members of minority groups, and 40 percent are over the age of 25. Almost half receive tuition assistance in some form.

However, it is also fair to say that SUNY is a system in jeopardy. The expansionist approach that characterized it in the 60s and 70s has given way to conservatism and retrenchment in the 80s and 90s. As with many state systems across the country, SUNY institutions have felt the pressure of rising costs and declining tax dollars available to fund public higher education. The SUNY system sustained 13 budget cuts between 1988 and 1996. To provide some sense of the magnitude of these cuts: in 1988, tax dollars available for SUNY's core operating budget were $1.8 billion; in 1995 that figure had declined to $733 million. This, of course, occurred during a time of rising costs. One response to the reduction of state tax dollars has been to significantly raise tuition. State university tuition levels have increased by 58 percent since 1992. This approach, however, jeopardizes one of the fundamental missions of the university system, i.e., to provide access to a quality education for all segments of the population. In fact, applications from students whose family incomes are less than $45,000 have declined sharply in the last few years.

In recognition of these challenges, the New York State Legislature asked the Board of Trustees of SUNY to develop "a multi-year, comprehensive, system-wide plan to improve cost efficiency" in the state university system. The resulting document, "Re-Thinking SUNY," was completed and submitted to the legislature in 1995. That document called for a number of reforms to address the crisis. One of the critical recommendations by the Board of Trustees was to increase the use of distance learning technologies to overcome some of the inefficiencies of a system comprised of many relatively small and dispersed campuses. While the original structure of SUNY has the advantage of providing local access for place-bound students, it can be fiscally inefficient because of the costs required to maintain many distributed facilities, and redundant services and academic programs. The Board of Trustees recommended strategic alliances to link together campuses to overcome some of these inefficiencies and to

reach out in new entrepreneurial endeavors. The document also pointed out to the legislature the need for initial investments in technology infrastructure to realize long-term benefits and savings.

SUNY Brockport, the Rochester Area Interactive Telecommunications Network, and WESTNET

SUNY Brockport is a comprehensive college serving approximately 9,000 students. Located in the community of Brockport along the Erie Canal about sixteen miles west of Rochester, the campus is the preeminent regional public university for the greater Rochester area. The campus is well aware of the changing needs of its regional communities. Part of Brockport's stated mission is to:

> ...provide flexible and high-quality postsecondary education. Program offerings in downtown Rochester and other area locations, the use of interactive technology to provide distance learning, and academic programs in non-traditional forms such as weekend college and a time-shortened degree respond to changing student needs.[1]

Brockport has been involved with instructional television for several years, most notably as a participant in the Rochester Area Interactive Telecommunications Network (RAITN), which provides a highly interactive two-way video classroom capacity between the campus, its metro center in downtown Rochester, and forty sites in the greater Rochester area. Using Frontier Communications fiber optic network, through the auspices of the regional Board of Cooperative Educational Services, live, two-way video, (RAITN) courses can be transmitted to as many as three receive sites simultaneously.

In answer to the challenges in "Re-Thinking SUNY," and in recognition of the opportunities provided by emerging technologies, a group of SUNY campuses[2] in western New York decided in 1995 to develop a proposal to form a distance learning partnership. Brockport's successful experience with offering between 8 and 10 courses per term on RAITN was an important component of this decision. Some of the other campuses also had experience with instructional television and it appeared that the campuses with the most experience could assist those that had less.

The proposal was made to the SUNY system Office of Educational Technology (OET) to form WESTNET, a distance learning network that would provide two-way compressed video connections and related classroom equipment at each of the member institutions. The long-term vision is to expand the network in future years to link all SUNY campuses. Of 128 funding proposals submitted to OET, 13 were funded including WESTNET. With this assistance from the SUNY central office and additional support from the participating campuses, the network was established and courses offered for the first time in spring term 1997.

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[1] SUNY Brockport's mission statement as adopted July 9, 1996.

[2] The campuses are Alfred, Brockport, Cortland, Fredonia, Genesee Community College, Geneseo, Jamestown Community College, Finger Lakes Community College, and Monroe Community College (all joining the network at the outset), the University of Buffalo, and Buffalo State (these latter two joining in fall 1997).

The participating institutions recognized the value of WESTNET in terms of:

- addressing the budget constraints referred to above;
- meeting the increasing demand to provide access to education for all age groups of the population, coupled with a general "aging" of the student body;
- recognizing that the university of the future would not be limited to a physical campus; and
- the potential ability to combine faculty resources from several campuses in order to continue to offer major programs that otherwise would be eliminated due to insufficient enrollment demand at individual campuses.

In WESTNET, the campuses plan to create a model for a distance learning network that addresses both the technical infrastructure and the administrative support required for success; it will become a basis to shape policy regarding some of the more difficult aspects of collaboration including issues related to course sharing and articulation, FTE and tuition allocation, academic calendar coordination, student services, faculty compensation, marketing, and copyright and intellectual property. Additionally, the WESTNET project will enhance student learning through the use of innovative instructional approaches, exposure to students from other campuses, and by providing students experience with these emerging technologies.

At the root of WESTNET is the supposition that without the telecommunication infrastructure, campuses simply would not be able to continue to individually offer the kind of specialized and diversified courses that become feasible with a group effort. This factor was particularly important in the development of a Philosophy Consortium by faculty from several of the campuses. That consortium has provided a model for faculty collaboration that could be expanded to other disciplines as the network expands. These faculty members analyzed their respective college's needs and expertise in their discipline, recruited students for the courses, and even sat in on each other's classes.

In addition to access, the WESTNET founders believe that the technology infrastructure will also result in the enrichment of courses as scholars and experts from all over the world can be brought into the virtual classroom in a way that would not otherwise be possible.

WESTNET Implementation

The first objective of WESTNET was to provide each campus with a multimedia distance learning classroom with similar capabilities and to build the infrastructure required to link the campuses with SUNYnet. Infrastructure in this sense refers to both the network requirements to distribute electronic information between the campuses and the administrative systems to make a cooperative but distributed system function effectively. Many of the campuses have some distance learning experience and/or equipment in place, and the intent was to use the existing facilities to the greatest extent possible in order to minimize the total project costs. The challenge was to create a seamless network and create compatible classrooms and standardization where possible. In designing the classrooms and networks the previous experience of Brockport was invaluable. Brockport's RAITN network has already been described.

The multi-site network was established using either V-Tel or PictureTel two-way videoconferencing systems, with the signal delivered by dedicated T1 or ISDN lines at 384 kbps. To enhance the potential for collaboration with other distance learning sites, the

network was designed to conform with H.320/T.120 standards. Each classroom has 22 student stations and is designed to be operated by the course instructor.[3]

WESTNET is coordinated by a director and manager to ensure efficient and consistent operations. The director is located at SUNY Brockport and works with curricular leaders at the other participating campuses. The manager, also at Brockport, works with technical liaisons at the campuses. Faculty training has been handled in a variety of ways. The SUNY Office of Educational Technology has provided some training across the WESTNET system. Individual campuses such as Brockport, Cortland, and Genesee Community College have also provided some of their own in-house faculty training programs. Professors and enrolled students regularly communicate with each other by telephone and e-mail. One of the courses (spring '97) has made use of a home page on the World Wide Web to distribute course materials. It is expected that the WESTNET courses will implement more web-based communication in the future. This asynchronous component will further enhance the flexibility of the interactive distance learning system.

To consider the experience gained with actual courses offered via WESTNET, this case presents evaluation data from five courses that were delivered during the spring 1997 semester—one in Education, one in Nursing, and three in Philosophy.

EDU 490 Curriculum in Early Childhood Special Education An overview of curriculum theory, content, and instructional strategies as they relate to young children with special needs. Content includes individual family service and education plans, the selection of intervention plans, and environment design.

Nursing 358 RN to BSN Helps registered nurses integrate the world of nursing as they know it and the world of baccalaureate nursing; offers the returning nurse student an opportunity to see solutions to the challenges that arise when an adult learner returns to school; and provides a forum for expressing feelings and concerns.

PHL 390 Utopias Focuses on the literary, philosophical, and historical manifestations of the Western impulse to design ideal societies. Examination of the implicit criticism of existent social forms and critique of the role of utopian thought.

PHL 490 God, Freedom, and Evil A survey of the best contemporary philosophical thinking on the three famous arguments: (1) the ontological argument for God's existence; (2) the problem of evil argument for God's nonexistence; and (3) the free will defense by which theists attempt to account for evil.

PHL 491 Seminar on Hume and Kant An intensive study of the major works of David Hume and Emmanuel Kant, including Hume's *First Enquiry and Treatise*, and Kant's *Critique of Pure Reason*.

Table 1 shows the courses and the campuses from which they originated as well as the enrollments at all sites. Cortland, for example, was the origination site for PHL 390. Seven

[3] In addition to the videoconferencing units, classrooms have Parkervision cameras in the front and back. These automatic tracking cameras eliminate the need for a "camera operator" or extensive camera work on the part of the instructor during the class sessions. All classrooms are equipped with four monitors, two in front and two in back, enabling all groups to see each other, the instructor, and auxiliary inputs quite easily. All classrooms are also equipped with Elmo Visual Presenters which serve as document cameras; computers; a record and playback VCR; and slide projectors. All student desks are equipped with push-to-talk microphones, facilitating student-to-student and student-to-instructor interactions. The rooms have also been designed for effective video presentation by the use of acoustic treatments on ceilings and walls, carpet, and non-glare lights.

students were enrolled at Cortland and 5 were enrolled at Brockport for a total of 12. A total of 76 students were enrolled in the five courses, 54 at the originating (broadcast) sites and 22 at receive sites (Alfred State was the only campus that did not originate a course).

Table 1—Enrollments in Five WESTNET Courses, Spring 1997

Originating Sites	All Sites					
	Brockport	Cortland	Fredonia	Genesco	Alfred	Total
Brockport						
•Nurs 358	11				2	13
•PHL 491	11	2	3			16
Cortland						
•PHL 390	5	7				12
Fredonia						
•PHL 490	8		15			23
Genesco						
•EDU 490	2			10		12
Total	37	9	18	10	2	76

Benefits of WESTNET

Student Learning Outcomes

Grades

Course grades for all 76 students enrolled in the five courses were obtained. Two grades of incomplete and two grades of failing were eliminated from the data because assignment of either grade could be for reasons other than course performance. The grade distributions and the average grade for students at the sending and the receive sites are shown below in Table 2.

Table 2—Grade Distributions and Average Grade for Sending and Receive Sites

	Grades			
Grade Earned	**A**	**B**	**C**	**Avg. Grade**
Receive site (n=20)	30.0%	60.0%	10.0%	3.2
Send site (n=52)	59.6	32.7	7.7	3.5
Grade Expected				
Receive site (n=15)	26.6	64.3	7.1	3.1
Send site (n=45)	57.8	35.6	6.6	3.5

Table 2 contains two notable results: (1) receive site students earned more "B"s and fewer "A"s than sending site students and (2) the receive site students expected to earn such lower grades. Examination of grades in the individual courses revealed the same pattern of receive site students earning lower grades than sending site students in four of five cases. The one exception involved only two receive site students.

An analysis of the grade data shows that the proportion of "A" grades earned by sending site students is significantly greater (at the 5 percent level) than the proportion earned by receiving site students. The difference in the proportion earning grades of "A" *or* "B" at the two groups, however, was not statistically significant.

Student Survey

An attitude survey was conducted with the students enrolled in the five WESTNET courses in spring term 1997. Sixty usable survey forms were obtained (out of a total enrollment of 76). Of these, 45 were from the sending sites and 15 from receive sites as shown in Table 3 below along with other demographic data for the respondents.

Table 3–Demographic Data for Survey Responses

Students at receiving sites Students at sending sites	22 (15 surveys returned) 54 (45 surveys returned)
Student level (60 respondents)	54 upper division 6 graduate
Average age	26.5 years
Gender	30 female 30 male
Ethnicity	58 white/non-Hispanic 1 American Indian/Native Alaskan 1 Hispanic/Latino
Grade point average of respondents	2.8 at receive sites 3.3 at sending sites
Grade expected in course	3.2 at receive sites 3.6 at sending sites
Experience with interactive distance learning	50 no experience 8 telecourse experience 2 interactive television experience

Differences in Overall Attitude

Students responded to each of 16 statements contained in the survey about interactive television (ITV) on a Likert scale of one to five (from strongly disagree to strongly agree where a response of three is considered neutral). All sixteen responses were averaged on each of the 60 survey forms to obtain each subject's overall attitude. The 60 overall attitudes were then averaged to arrive at a mean value 3.17 which indicates a slightly positive overall attitude.[4]

The mean overall attitude for students at receiving sites was 3.5, at sending sites it was 3.1. This difference was significant at the 5 percent level. Other tests were conducted for differences in mean overall attitudes between (1) female and male students, (2) younger (<25) and older students, (3) higher (>3.2) and lower GPAs, (4) higher ("A") and lower expected course grades, and (5) amount of prior experience with instructional television (ITV). There were no significant differences (5 percent level) in mean attitude between students in any of these five categories.

[4] A statistical test showed that this value was significantly different from the neutral value of 3 at the 5 percent level.

Specific Item Responses

Table 4 provides a detailed summary of the item responses. Tests were conducted to determine if mean responses for each item by receive site students were significantly different than those of sending (broadcast) site students. In the cases where there were no significant differences (at the 5 percent level), a pooled response was calculated. If there was a significant difference, separate mean responses were calculated. The range of mean responses was from 2.1 to 4.3. In the table, the numerical values are converted to "agree" for values of 3.5 and above, to "neutral" for values between 2.6 and 3.4, and "disagree" for values 2.5 and less (see the Appendix for more detail).

Table 4—Attitude Survey of Students in WESTNET Courses, Spring 1997

Receive and sending site mean responses that *were not* statistically different (5% level)	**Receive/ Sending Site**
• ITV requires students to be active learners	Agree
• ITV makes additional work for teachers	Agree
• ITV puts additional work on students	Neutral
• ITV improves student attitudes toward the subject being taught	Neutral
• ITV raises test scores	Disagree
• ITV decreases teacher-pupil interaction in the classroom	Neutral
• ITV isolates students from one another	Disagree
• We should rethink how the curricula are organized to make maximum use of new technologies	Agree
• With ITV it is easier for the teacher to show interest in students	Disagree
• I am not concerned about taking an ITV course	Neutral
• Technologically oriented individuals do better in an ITV course	Disagree

Receive and sending site mean responses that *were* statistically different (5% level)	**Receive Site**	**Sending Site**
• ITV increases stress students experience in the classroom	Disagree	Neutral
• With ITV it is difficult for teachers to know when students are having trouble with their work	Disagree	Neutral
• I have a positive feeling about taking an ITV course	Agree	Neutral
• It is hard to ask questions in an ITV class	Disagree	Neutral
• It is fun to participate in an ITV course	Agree	Neutral

As can be seen from the top panel of the table, students at both sites had similar opinions to the effect that ITV requires students to be (more) active learners, makes more work for teachers, and that the curricula should be reorganized to make more use of the new technologies.

Both groups expressed essentially a neutral attitude regarding the additional work ITV makes for students, its effect upon a student's attitude toward the subject matter, and whether they had any concern about taking (another) ITV course. The students also indicated that they did not believe that ITV increases test scores, isolates students from one another, makes it easier for the teacher to show an interest in students, or that technologically oriented individuals do better in such courses.

The second panel of the table shows the responses that were different for the receive and sending site students. Here the student responses at the sending sites were all neutral.[5] The receive sites students indicated they have a positive feeling about ITV and that it is fun to participate in such a course. They disagreed that ITV increases stress in the classroom, that ITV makes it more difficult to know when students are having trouble with their work, or that it is hard to ask questions in an ITV class.

Open-Ended Questions

Students had the opportunity to respond to three open-ended questions in addition to the sixteen given statements. The questions and some typical responses are as follows:

What concerns you about interactive television as a mode of instruction?

Students at both send and receive sites expressed concerns about: (1) communication and logistical problems inherent in a complicated distance learning network, (2) the depersonalization which can occur in such systems, and (3) the sometimes negative effect of technology (use of microphones, cameras, etc.) on discussions. Some students at sending sites expressed concern about how the students at receiving sites were doing in the course.

There was also a great deal of apprehension about the interactive distance learning system being used as a way to further reduce the number of faculty in academic departments. Some students felt that technology will not be used to make the educational system better, but rather to initiate cutbacks and "downsizing." One student at a sending site wondered whether the flashy technology is too expensive and not really worth the effort expended to utilize it.

What most interests you about interactive television as a mode of instruction?

Many students at both receiving and sending sites gave access-related examples: the possibility of taking courses originating far from their homes, the increase in number and variety of programs and professors available to them, the benefit of interacting with students from different locations, and the sheer convenience of studying at a distance. The exciting quality of cutting-edge technology was not lost on a number of students.

How do you feel about (the use of instructional) technology in general?

Responses to this question indicated a positive personal reaction to the use of technology in the classroom. Only a small minority indicated they had real trouble dealing with the electronic delivery system being used to bring a course to them. This is consistent with the generally positive overall attitude that emerged from the objective part of the survey.

[5] The neutral answers of students at the sending site are not surprising since the questions all dealt with aspects of taking the course at a receive site.

Student Learning Outcomes Conclusions

The overall evaluation of learning outcomes presents a mixed picture.

Based upon the analysis of the distribution of "A" grades it might be concluded there is a negative effect upon the quality of student learning outcomes related to the use of videoconferencing at the remote sites. Such a conclusion is premature, however. At least two alternative explanations merit further investigation:

(1) The lower grades earned by students at the remote sites could be due to the lower overall ability of these students as evidenced by their lower GPAs (see Table 3) and as further evidenced by their lower grade expectations as shown in Table 2.

(2) The lower grades may be in some way related to the start-up nature of the network in spring 1997 and course delivery methods.

Additional study of this phenomena is clearly warranted.

The student survey results provide a more positive picture. Receive site students portrayed a more positive overall attitude in the survey than sending site students. The responses to the specific survey items where there were no significant differences among the send and receive site students provide no indications unfavorable toward WESTNET. For the specific survey items where receive site responses were statistically different than send site responses, the send site responses were uniformly neutral and the receive site responses were uniformly supportive of WESTNET.

Concerns indicated by individual responses to the open-ended questions suggests some problems that are likely to be remedied by more experience with such forms of instruction. Another concern, that the technology will be used as a reason to downsize academic departments, suggests the existence of a misunderstanding that the technology is the source of the fiscal problem facing the system rather than a possible solution to the fiscal problem. Finally, both receive and send sites students understand the benefits of the technology as a means of improving access.

Access: WESTNET and Western New York

Western New York is a region comprised of 22 counties to the west of Route 81 and the Finger Lakes area. Its population is estimated to be 3.6 million,[6] almost twenty percent of the state's total. The 29 various campuses of the SUNY system (state operated, statutory, and community colleges) located within the region are particularly important to this population in that 75 percent of college enrollments from the region attend a SUNY campus (as compared to 40 percent across the state).

One key to WESTNET's usefulness lies in its potential for maintaining and expanding educational access to the citizens of western New York state. Given the financial constraints the campuses are operating under, some downsizing of academic departments is occurring. Such downsizing threatens the viability of degree programs on campuses with relatively small departments and numbers of majors. Course sharing among campuses is one way to maintain degree programs and provide adequate course offerings even where campus departments are relatively small.

[6] U.S. Bureau of the Census, Estimates of the Population of Counties, July 1, 1996 (CO-96-7).

WESTNET has the potential to be the prototype for course sharing in New York. The creators of the Philosophy Consortium at Brockport, Fredonia, and Cortland, for example, have shown that an important traditional discipline can thrive in hard economic times by creatively pooling scarce resources and sharing courses among campuses. The Nursing Department at Brockport overcame daunting geographical challenges to deliver high-quality medical instruction to Alfred State. Geneseo was able to provide a highly specialized course in Special Education to Brockport. Without WESTNET, students in these five locations would simply not have had access to these courses.

Institutional Renewal and Growth

WESTNET and similar networks have the potential to help academic departments and degree programs survive and preserve important specialty areas provided course sharing arrangements among the campuses can be developed. These course sharing arrangements are key to the success of WESTNET.

In an articulation or "transfer credit" sense such "sharing" requires that the receiving campus(es) treat the course as their own, that it count for credit toward the campus's degree major just as though it were offered by the local department. But the sharing goes beyond agreements about accepting a course for transfer credit. From a financial perspective, low enrollment courses are "expensive" for a campus to offer in the sense that the enrollments generate less revenue (from both the state and student tuition) than it costs to offer the course, or less revenue than could be obtained by using the faculty resource to offer another, higher enrollment course. By providing a less expensive alternative WESTNET serves to reduce the losses. But the demonstration of this (see Table 5 and Chart I, following in the section on WESTNET Cost Estimates) obscures an important question: how are the savings distributed among the participating campuses.[7]

If there is a net benefit (cost saving) in total from course sharing, the benefit can be distributed in such a way that all parties are better off (incurring less expense than if they had each offered a separate version of the course on campus). In fact, there are many ways the cost savings can be shared. One of the benefits of WESTNET is the opportunity it provides for the campuses to better understand the cost savings phenomena and to develop specific ways of implementing it.

Cooperative Arrangements that Are Developing to Facilitate Course Sharing

- The Philosophy Consortium is starting to expand to other SUNY campuses (including Oswego, which is not currently in WESTNET). The philosophy departments have agreed to record shared course FTE at the receiving campuses where the students enroll. Since the participating departments both originate and receive courses, the consequent FTE gains and losses are approximately offset.
- A rule that is coming to be generally accepted is that the receiving campus pays the related communications line charges.

[7] All campuses involved incur some costs—the broadcast campus has studio costs, transmission costs and faculty costs; the receive campus has only studio costs. Even though the costs in total are less than the costs of two or three live sections of the course, for the broadcast campus the costs are greater because the sending campus incurs the faculty staffing cost as well as the studio and communications costs.

- Brockport's Nursing Department will continue in the spring term to provide a course to Alfred and is making plans to offer its entire curriculum over the WESTNET system.
- A course in Beginning Japanese was provided from Brockport to Fredonia in fall 1997. The offering will be repeated in subsequent terms. Other campuses have indicated an interest.
- Brockport originated an advanced course in French Civilization, French Attitudes that was received at Fredonia and Oswego fall 1997. Other courses are planned. The potential for consortia in foreign languages on WESTNET and similar systems is great since small classes are the norm in these disciplines with their highly specialized course offerings.
- Brockport and Cortland are planning to exchange political science courses in spring and fall 1998. Fredonia has also indicated an interest in participating.
- Brockport's Recreation and Leisure Department and Finger Lakes Community College's Travel and Tourism Department are developing plans for collaboration on course offerings beginning in fall term 1998.

Faculty Development Opportunities

WESTNET professors interact regularly with each other, regardless of discipline or home campus. Training sessions and workshops are interdisciplinary, and include technicians and administrators as well as faculty. This is precisely the kind of spirit that will eliminate academic barriers and bring about needed curricular change in higher education as we approach the 21st century.

Based upon a series of interviews, the instructors in the five courses indicated that their involvement with WESTNET offered them new avenues for professional development. These include the possibility of continuing to teach advanced courses, the opportunity to audit courses of colleagues from other institutions, and the availability of high-tech equipment for classroom use. They felt that their teaching was greatly enhanced by the reorganization of their subject materials to suit this new delivery system. Instructors were pleased with the opportunity to reach new students in their courses, and to offer this clientele a greater variety of courses than had previously been possible. Professors felt that the technology encouraged debate and discussion, and that enjoyable and exciting moments abounded during the semester.

Teachers also learned that the technological environment can be more stressful and requires more planning than the traditional classroom setting. Technical problems do occur, and the logistics of getting materials from campus to campus can sometimes become a bit intricate. One instructor saw the need for the elaboration of a clear set of policies relative to distance learning. Another pointed out that vexing academic calendar issues need to be resolved. A third colleague found it difficult to evaluate students' group work at receiving sites, and a fourth encountered reluctance on the part of some students to using the microphone or to being videotaped. Finally, one professor was troubled by the possibility that WESTNET offers to administrators looking for ways to reduce the size of academic departments.

Recommendations for improvement ranged from systemwide recommendations (policy-making, academic calendar, infrastructure) to suggestions for graduate classroom assistants, an improved courier system, a photocopier in every interactive distance learning room, and bigger whiteboards. One very good suggestion was that WESTNET administrators create a network-wide release form for videotaping classes.

WESTNET Cost Estimates

The costs of a course offered to multiple sites via WESTNET was estimated based upon direct operating and capital costs for a WESTNET studio classroom and transmission costs. Tables 5 through 9 below summarize the data and the cost estimation methodology upon which the estimates are based.

The WESTNET studio classrooms are equipped for two-way live video and have other multimedia capabilities. Each has 22 student stations and is designed to be operated by the course instructor. Capital costs for a typical WESTNET studio classroom, shown in Table 5, are converted to an annual imputed cost based upon the useful lives of the assets. The annual costs are allocated to (three-unit semester) courses assuming 30 courses per academic year plus six in the summer for a total of 36.

Table 5—Estimated Capital Cost for a WESTNET Studio

	Cost	Estimated Useful Life	Annual Imputed Cost
Remodel Classroom	$28,400	25	$1,136
Equipment	99,600	5	19,920
Furniture	9,548	10	955
Install ISDN Lines (4)	1,002	10	100
Total	$138,552		$22,111
Cost per course*			$614

**Assuming a studio sends/receives courses 45 hours per week, it can accommodate 15 (3-hour) courses per semester or 30 per academic year. An additional six courses are estimated for the summer.*

WESTNET administrative costs are shown in Table 6. The director has overall responsibility for the program including identifying and scheduling classes in the studio classrooms, distributing information about the program, and facilitating discussions among the campuses of the several issues relating to cooperative agreements and course sharing arrangements.

Table 6—WESTNET Estimated Administrative Costs

	Annual Costs
Director position	$45,000
0.5 Clerical position	10,000
Fringe benefits (@ 0.34)	18,700
Personnel total	73,700
Operating expenses	6,300
Office equipment*	2,000
Total	$82,000

**Based upon $10,000 initial equipment expense and five-year useful life.*

The half-time technical support position shown in Table 7 provides for equipment maintenance and assistance with classroom set up. Administrative overhead, shown in Table 6, is allocated to each studio assuming ten campuses are participating in the network.

Table 7—Estimated Operating Costs for WESTNET Studio

	Annual Costs
0.5 Technical support position	$15,000
Fringe benefits (@ 0.34)	5,100
ISDN lines (4)	4,056
Operating expenses	3,500
Administrative overhead*	8,200
Total	$35,856
Cost per course**	$996

**Calculated as 1/10th of the total from Table 6 based upon ten participating WESTNET campuses.*

***Assuming 36 courses per year (includes summer).*

In addition to a fixed monthly fee for the ISDN lines, as shown in Table 7, there is also an hourly charge for use of the lines. These transmission costs are attributed to the broadcast campus and are shown in Table 8 for two sites (one broadcast, one receive) and three sites (one broadcast and two receive). The costs don't rise proportionately because a second receive site has the additional requirement of bridge equipment.

Table 8—Estimated WESTNET Transmission Costs

Line Costs/Hour/Site = $34	Bridge Cost/per Hour = $58*	Hours/Course = 45
Number of Sites		**Cost/Course**
Two		$1,530
Three		$5,670

**The bridge is used only if more than two sites involved.*

Cost Summary and Cost Comparisons

The data in Tables 5 through 8 are summarized in Table 9 where they are augmented with faculty staffing costs to provide estimates of offering a WESTNET course at multiple (two or three) sites. The planning assumptions for this course sharing assume enrollments not exceeding 22 at the broadcast site, no more than two receive sites, and enrollments of 10 or fewer at each receive site. These limits are imposed to insure sufficient interaction among all students and the instructor and to minimize the logistical and administrative workload assumed by the instructor. In practice, these requirements limit WESTNET applications to courses with relatively small enrollments.[8]

The estimated cost of a WESTNET course is also compared in Table 9 with the cost of offering the same course in classroom format with a live instructor at two and three locations (where the cost is simply the staffing cost at one site multiplied by 2 or 3). Cost comparisons such as these are valuable but must be made with a clear understanding of their implications.

The comparison of WESTNET costs with the costs of offering the courses separately on each campus should not be interpreted to mean that offering the courses on each campus remains a viable alternative. It is not. Given the fiscal situation, WESTNET provides a less expensive way to deliver these courses that would otherwise be at risk of being eliminated at all sites. Concomitant with finding a less expensive way to deliver the courses, is the requirement to develop a means of sharing the costs of the alternative delivery method among the campuses involved.

[8] This is certainly a reasonable start-up strategy. One of the major initial benefits of WESTNET is the opportunity it provides to develop institutional arrangements for course sharing. Such arrangements may be more easily developed when relatively small numbers of FTE are involved.

In response to the fiscal situation, a primary objective of WESTNET is to improve the viability of programs with insufficient student demand to warrant offering courses (with small enrollments) on several campuses. Table 9 and Chart I both demonstrate that WESTNET provides such a less expensive alternative.[9]

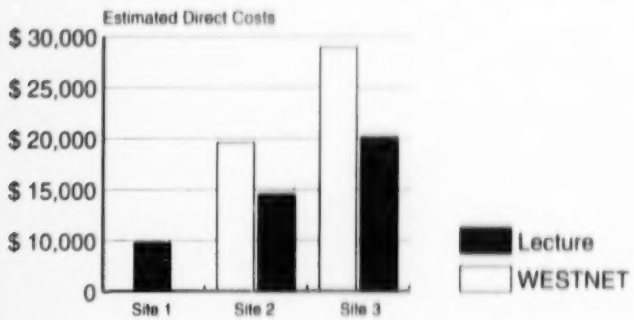
Table 9—Estimated Total Costs for a WESTNET Course and a Regular Lecture-type Course

Course Type	Number of Sites		
WESTNET	**One**	**Two**	**Three**
Faculty staffing costs*		$9,571	$9,571
Studio costs**		3,220	4,830
Transmission costs (from Table 4)		1,530	5,670
Total		$14,321	$20,071
Regular Lecture			
Faculty staffing costs*	$9,571	$19,142	$28,713

**Based upon an average full-time faculty salary (including fringe benefits) of $67,000 and an average of 7 courses per academic year per position.*

***The sum of costs per course from Tables 5 and 7 (i.e., $614+$996=$1,610) times the number of sites.*

Chart I—WESTNET Course Costs Compared with Lecture Costs



[9] The studio costs in this comparison were allocated based upon 36 course offerings per year. While this may represent a reasonable capacity estimate for the studios after a few years of operation, it is more than can be expected at the outset. It is reassuring to note that the relative comparisons in Table 9 are maintained even if the assumed rate of studio utilization is reduced by half, from 36 to 18 courses per year. This has the effect of doubling the studio costs allocated to a course. This changes the WESTNET totals from $14,321 to $17,541 for two sites and from $20,071 to $24,901 for three sites. These amounts are still less than the estimated costs for the regular lecture alternative.

Appendix

Table A—Student Attitude Survey, Mean Responses

Source, Bernard Petit, WESTNET Benefits Report, August 1997

	Student Attitude Survey, Mean Responses	Receive	Send
P	• ITV requires students to be active learners	3.6	
N	• ITV makes additional work for teachers	2.3	
N	• ITV puts additional work on students	3.3	
P	• ITV improves student attitudes toward the subject	2.7	
N	• ITV increases the amount of stress and anxiety students experience in the classroom	3.7	2.9
P	• ITV raises test scores	2.1	
N	• ITV decreases teacher-pupil interaction in the classroom	3.3	
N	• ITV isolates students from one another	3.5	
P	• We should rethink how the curricula are organized to make maximum use of new technologies	3.7	
P	• With ITV it is easier for the teacher to show interest in students	2.5	
P	• I am not concerned about taking a course on ITV	3.2	
N	• With ITV it is difficult for teachers to know when students are having problems with their work	3.7	2.9
P	• I have a positive feeling about taking an ITV course	4.1	3.3
N	• It is hard to ask questions in an ITV class	4.1	3.3
P	• It is fun to participate in an ITV course	4.3	3.4
N	• Technologically oriented individuals do better in an TV course	3.6	

Note 1 Statements preceded with a "P" are positive, the range of responses is: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree. Statements preceded with an "N" are negative and the scor ing of responses has been reversed, i.e., 1=strongly agree, etc.

Note 2 Where the mean responses of receive and sending site students were not significantly different at the 5 percent level, the pooled mean response is tabulated.

Table B provides the interpretations assigned to the numerical responses used in Table 4 of the report.

Table B—Interpretation Assigned to Mean Responses from Table A

Response Range	Statements Deemed Positive	Statements Deemed Negative
1.0-1.5	strongly disagree	strongly agree
1.6-2.5	disagree	agree
2.6-3.4	neutral	neutral
3.5-4.4	agree	disagree
4.5-5.0	strongly agree	strongly disagree